

Claims

- [c1] A method of driving a bistable electro-optic display having a plurality of pixels, each of which is capable of displaying at least three gray levels, the method comprising:
 storing a look-up table containing data representing the impulses necessary to convert an initial gray level to a final gray level;
 storing data representing at least an initial state of each pixel of the display;
 receiving an input signal representing a desired final state of at least one pixel of the display; and
 generating an output signal representing the impulse necessary to convert the initial state of said one pixel to the desired final state thereof, as determined from said look-up table.
- [c2] A method according to claim 1 further comprising storing data representing at least prior state of each pixel prior to said initial state thereof, and wherein said output signal is generated dependent upon both said at least one prior state and said initial state of said one pixel.
- [c3] A method according to claim 2 wherein data is stored representing at least two prior states of each pixel and said output signal is generated dependent upon said at least two prior state and said initial state of said one pixel.
- [c4] A method according to claim 1 further comprising receiving a temperature signal representing the temperature of at least one pixel of the display and generating said output signal dependent upon said temperature signal.
- [c5] A method according to claim 4 wherein said look-up table stores multiple values for each transition from an initial gray level to a final gray level, said multiple values representing the values required for a specific transition at a specific temperature.
- [c6] A method according to claim 5 further comprising interpolating between adjacent values for a transition when the temperature signal indicates a temperature intermediate the temperatures to which said adjacent values relate.
- [c7] A method according to claim 4 wherein said look-up table stores functions of

temperature, and wherein said output signal is generated by calculating the value of the relevant function at the temperature indicated by said temperature signal.

- [c8] A method according to claim 1 further comprising generating a lifetime signal representing the operating time of said pixel and generating said output signal dependent upon said lifetime signal.
- [c9] A method according to claim 1 further comprising generating a residence time signal representing the time since said pixel last underwent a transition and generating said output signal dependent upon said residence time signal.
- [c10] A method according to claim 1 wherein said output signal represents the period of time for which a substantially constant drive voltage is to be applied to said pixel.
- [c11] A method according to claim 10 wherein said pixel is driven in a scan comprising a plurality of sub-scan periods and said output signal represents determines during which of said sub-scan periods a drive voltage is to be applied to said pixel.
- [c12] A method according to claim 1 wherein said output signal comprises at least one polarity bit representing the polarity of the impulse necessary to convert the initial state of said one pixel to the desired final state thereof.
- [c13] A method of driving an electro-optic display having a plurality of pixels, each of which is capable of displaying at least three gray levels, the method comprising:
storing a look-up table containing data representing the impulses necessary to convert an initial gray level to a final gray level;
storing data representing at least an initial state of each pixel of the display;
receiving an input signal representing a desired final state of at least one pixel of the display; and
generating an output signal representing the impulse necessary to convert the initial state of said one pixel to the desired final state thereof, as determined from said look-up table, said output signal representing the period of time for which a substantially constant drive voltage is to be applied to said pixel.

- [c14] A device controller for controlling a bistable electro-optic display having a plurality of pixels, each of which is capable of displaying at least three gray levels, said controller comprising:
 storage means arranged to store both a look-up table containing data representing the impulses necessary to convert an initial gray level to a final gray level, and data representing at least an initial state of each pixel of the display;
 input means for receiving an input signal representing a desired final state of at least one pixel of the display;
 calculation means for determining, from the input signal, the stored data representing the initial state of said pixel, and the look-up table, the impulse required to change the initial state of said one pixel to the desired final state;
 and
 output means for generating an output signal representative of said impulse.
- [c15] A controller according to claim 14 wherein said storage means is also arranged to store data representing a least one prior state of each pixel prior to said initial state thereof, and said calculation means is arranged to determine said impulse dependent upon said input signal, said initial state of said pixel and said prior state of said pixel.
- [c16] A controller according to claim 15 wherein said storage means is arranged to store data representing at least two prior states of each pixel, and said calculation means is arranged to determine said impulse dependent upon said input signal, said initial state of said pixel and said at least two prior states of said pixel.
- [c17] A controller according to claim 14 wherein said input means is arranged to receive a temperature signal representing the temperature of at least one pixel of the display, and said calculation means is arranged to determine said impulse dependent upon said input signal, said initial state of said pixel and said temperature signal.
- [c18] A controller according to claim 17 wherein said storage means is arranged to store multiple values for the impulses necessary to convert an initial gray level

to a final gray level, said multiple values representing the values required for a specific transition at a specific temperature.

[c19] A controller according to claim 18 wherein said calculation means is arranged to interpolate between adjacent ones of said stored multiple values when said temperature signal indicates a temperature intermediate the temperatures to which said adjacent stored values relate.

[c20] A controller according to claim 17 wherein said storage means is arranged to store functions of temperature, and said calculation means is arranged to determine said impulse by calculating the value of the relevant function at the temperature represented by said temperature signal.

[c21] A controller according to claim 14 further comprising lifetime signal generation means arranged to generate a lifetime signal representing the operating time of said pixel, said calculation means determining said impulse from said input signal, said stored data representing the initial state of said pixel and said lifetime signal.

[c22] A controller according to claim 14 further comprising residence time signal generation means for determining the residence time since said pixel last underwent a transition and for generating a residence time signal representing said residence time, said calculation means determining said impulse from said input signal, said stored data representing the initial state of said pixel and said residence time signal.

[c23] A controller according to claim 14 wherein said output means generates a signal representing the time for which a substantially constant drive voltage is to be applied to said pixel.

[c24] A controller according to claim 14 wherein said output signal comprises at least one polarity bit representing the polarity of said impulse.

[c25] A method of driving a bistable electro-optic display having a plurality of pixels, each of which is capable of displaying at least three gray levels, the method comprising:

storing a look-up table containing data representing the impulses necessary to convert an initial gray level to a final gray level;
 storing data representing at least an initial state of each pixel of the display;
 receiving an input signal representing a desired final state of at least one pixel of the display; and
 generating an output signal representing the impulse necessary to convert the initial state of said one pixel to the desired final state thereof, as determined from said look-up table, the output signal representing the period of time for which a substantially constant drive voltage is to be applied to said pixel.

[c26]

A device controller for controlling an electro-optic display having a plurality of pixels, each of which is capable of displaying at least three gray levels, said controller comprising:
 storage means arranged to store both a look-up table containing data representing the impulses necessary to convert an initial gray level to a final gray level, and data representing at least an initial state of each pixel of the display;
 input means for receiving an input signal representing a desired final state of at least one pixel of the display;
 calculation means for determining, from the input signal, the stored data representing the initial state of said pixel, and the look-up table, the impulse required to change the initial state of said one pixel to the desired final state;
 and
 output means for generating an output signal representative of said impulse, said output signal representing the period of time for which a substantially constant drive voltage is to be applied to said pixel.

[c27]

A device controller comprising:
 storage means arranged to store both a look-up table containing data representing the impulses necessary to convert an initial gray level to a final gray level, and data representing at least an initial state of each pixel of the display;
 input means for receiving an input signal representing a desired final state of at least one pixel of the display;

calculation means for determining, from the input signal, the stored data representing the initial state of said pixel, and the look-up table, the impulse required to change the initial state of said one pixel to the desired final state; and

output means for generating an output signal representative of said impulse, the output signal representing a plurality of pulses varying in at least one of voltage and duration, the output signal representing a zero voltage after the expiration of a predetermined period of time.

[c28] A driver circuit comprising:
output lines arranged to be connected to drive electrodes of an electro-optic display;
first input means for receiving a plurality of (n+1) bit numbers representing the voltage and polarity of signals to be placed on the drive electrodes; and
second input means for receiving a clock signal,
the driver circuit being arranged such that, upon receipt of the clock signal, the driver circuit displays the selected voltages on its output lines.

[c29] A driver circuit comprising:
output lines arranged to be connected to drive electrodes of an electro-optic display;
first input means for receiving a plurality of 2-bit numbers representing the voltage and polarity of signals to be placed on the drive electrodes; and
second input means for receiving a clock signal,
the driver circuit being arranged such that, upon receipt of the clock signal, the driver circuit displays voltages selected from $R + V$, R and $R - V$ on its output lines, where R is a reference voltage and V is the maximum difference from the reference voltage which the driver circuit can assert.

[c30]

A method for driving an electro-optic display having a remnant voltage, the method comprising:

- (a) applying a first driving pulse to a pixel of the display;
- (b) measuring the remnant voltage of the pixel after the first driving pulse; and
- (c) applying a second driving pulse to the pixel following the measurement of

the remnant voltage, the magnitude of the second driving pulse being controlled dependent upon the measured remnant voltage to reduce the remnant voltage of the pixel.